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COMPARATIVE SPINNING TESTS OF MEADE AND SEA ISLAND COTTONS.

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The ravages of the boll weevil have reduced the annual production of Sea Island cotton in the United States from 92,619 bales in 1917 to 6,916 in 1919, and the prospect for the crop of 1920 indicates an even lower figure. From present indications it is feared that the entire industry may be destroyed within the next few years. However, the Bureau of Plant Industry of the United States Department of Agriculture has developed a new variety of cotton which promises to replace the rapidly diminishing Sea Island crop. This new variety is known as "Meade."

The introduction of new varieties of cotton is usually attended with many difficulties because growers and manufacturers are reluctant to change from a well-known variety which has given satisfactory results for many years to another variety that is in the experimental stage of development. Such was the condition which prevailed at the time that the Meade cotton was first introduced in the Sea Island districts. The principal reason for experimenting with this new variety was to prepare for the damage that was expected would result to Sea Island cotton if the boll weevil should reach this region. It is thought that Meade has now been established on a commercial basis and that its future production is assured.

The Meade cotton was developed during 1912 and subsequent years from what was known locally as "Blackseed" or "Black Rattler"

Note.—This bulletin is of interest to the growers, cotton merchants, dealers, and manufacturers of Meade and Sea Island cottons.

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cotton grown near Clarksville, Tex. Its chief cultural characteristics as compared with the Sea Island cotton are its earlier maturing bolls increased production of lint and seed, and its larger bolls and consequent greater ease of picking.

The Meade cotton is a long-staple upland variety, producing under favorable conditions a fiber $1\frac{5}{8}$ inches long, of fine texture like the Sea Island. Because its seeds are nearly smooth it can be handled to advantage on common roller gins. There is little tendency to "butterfly"; that is, for the fibers to grow shorter at the base of the seed, which was one of the undesirable traits of the older long-staple upland varieties, such as Floradora, Sunflower, and Allen. So closely does the Meade fiber resemble Sea Island that the two can not be distinguished except by experts. It is said that Meade has been sold on the regular Sea Island market at Savannah at a premium over the mainland Sea Island.

PURPOSE OF THE SPINNING TESTS.[1]

The United States Department of Agriculture, through the cotton-testing specialists of the Bureau of Markets, has conducted spinning tests on representative bales of Meade and Sea Island cotton grown during the seasons of 1916–17, 1918–19, and 1919–20 in order to determine the practical spinning value of the Meade cotton in comparison with that of Sea Island.

GRADE AND STAPLE OF COTTON.

The grade of the cotton for the tests of 1916–17 and of 1918–19 was practically equal. That of the season of 1919–20 was represented by a mixture of Meade cotton grading No. $2\frac{1}{2}$, grown on sandy soil; by another mixture of Meade cotton grading No. 3, grown on clay soil; and by a mixture of Sea Island cotton grading No. $1\frac{1}{2}$. The length of staple of the cotton tested was $1\frac{5}{8}$ inches for all three seasons, excepting the Meade produced on clay soil, which was $1\frac{7}{16}$ inches in length of staple. The United States Official Cotton Standards for Sea Island cotton were used as a basis of comparison for both growths on which the 1919–20 tests were made, but the earlier tests were made before the official standards for Sea Island had been established; hence, it can only be stated that the grade of cottons used the first two years was equal as between Meade and Sea Island and approximately equal to the grades used in the last test.

[1] The spinning tests of the Meade and Sea Island cottons herein described were conducted independently during three different years. The test on the crop of 1916–17 was made in 1917 at the North Carolina State College of Agriculture and Engineering, West Raleigh, N. C., by William S. Dean, formerly assistant in cotton testing; the test on the crop of 1918–19 was made in 1919 at the New Bedford Textile School, New Bedford, Mass., by C. E. Killingsworth, formerly assistant in cotton testing; and the tests of the crop of 1919–20 were made in 1920 at the North Carolina State College of Agriculture and Engineering, West Raleigh, N. C., by William G. Blair, assistant in cotton testing.

MECHANICAL CONDITIONS.

All of the test lots were run under the same mechanical conditions except for minor changes in the draft to secure the required weight of sliver. These changes were necessary because the Meade was slightly more wasty than the Sea Island.

PERCENTAGES OF WASTE.

Accurate records were kept of the amount of cotton fed to and delivered by each machine and of the waste discarded at each process. The invisible loss depends upon the grade of the cotton and the atmospheric conditions under which it is being manufactured. To offset the effect of the latter an attempt was made to maintain the relative humidity at 65 per cent, but because of the absence of humidifiers in the picker room it was not always possible to keep a constant humidity in that room, which caused slight variations in the invisible loss.

Table 1 gives the percentages of visible waste obtained at the pickers, cards, and combers; the invisible waste; and the combined visible and invisible waste from both the Meade and Sea Island cottons tested.

TABLE 1.—*Percentages of waste obtained from Meade and Sea Island cotton during the seasons shown.*

	1916–17		1918–19		1919–20		
	Meade cotton.	Sea Island cotton.	Meade cotton.	Sea Island cotton.	Meade cotton, sandy soil.	Meade cotton, clay soil.	Sea Island cotton.
Visible waste:							
Pickers [1]	1.80	1.04	1.63	1.63	2.34	3.14	1.05
Cards [1]	7.66	7.04	5.70	5.32	6.49	10.01	5.03
Combers [1]	22.45	23.26	19.39	15.03	18.85	16.12	15.20
Total visible [2]	29.48	29.34	24.82	20.55	25.51	26.19	19.79
Invisible waste [2]	.74	.27	2.12	.74	2.54	3.97	3.63
Total visible and invisible waste from pickers, cards, and combers [2]	30.22	29.61	26.94	21.29	28.05	30.16	23.42

[1] Based on the net weight fed to the respective machines.
[2] Based on the net weight fed to the opener picker.

These waste percentages show that the Meade and Sea Island cotton were practically equal in wastiness for the season of 1916–17, the percentages of visible waste being 29.48 and 29.34, respectively. The tests made on the cotton grown in the season of 1918–19 show that there was 4.27 per cent more visible waste in the Meade than in the Sea Island cotton. This difference was almost entirely due to the waste made on the comber. The tests made on the crop of 1919–20 showed a difference of 5.72 per cent more visible waste for the sandy soil and 6.40 per cent for the clay soil Meade than for the Sea Island.

The greater part of this difference in waste occurred at the pickers and cards, and may be partly accounted for by the lower grade of the Meade selected for the test.

On averaging the results of the tests for the three seasons, it was found that on the pickers, the Meade cotton was 0.82 per cent more wasty than the Sea Island; on the cards, 1.40 per cent; on the combers, 1.94 per cent; and for all three processes, 3.50 per cent. The difference on the comber could be eliminated by slight adjustments of this machine, so that the difference in the wastiness of the two cottons might be reduced to an almost negligible amount.

BREAKING STRENGTH OF YARN.

Both growths of cotton were spun into 23's, 40's, 60's, 80's, and 100's yarn. Each number of yarn was produced with three different twists, namely those indicated by the twist multipliers 3.25, 3.50, and 3.80. That is, these figures multiplied by the square root of the number of yarn being spun give the turns of twist per inch in the yarns. The results of the twist tests were not conclusive in that they show some cases in which the strength of the yarn increased on changing the twist multiplier from 3.5 to 3.8, and other cases in which the strength decreased with the greater twist. The same facts were evident when the twist multiplier was changed from 3.5 to 3.25.

A comparison of the breaking strengths of the Meade and Sea Island cottons is shown in Table 2, in which the breaking strength in pounds per skein of 120 yards for the various numbers of yarn having a twist equal to 3.5 times the square root of the number of yarn is given.

TABLE 2.—*Breaking strength, in pounds, per skein of 120 yards of various sizes of yarns spun from Meade and Sea Island cotton grown in different seasons.*

(3.50 twist multiplier used.)

Season.	Size of yarn.	Meade cotton.		Sea Island cotton.
1916–17	23's	129.7		144.7
	100's	15.2		17.4
1918–19	23's	109.2		128.7
	40's	60.1		69.8
	60's	35.4		39.4
	80's	24.1		25.9
	100's	16.3		17.6
		Sandy soil.	*Clay soil.*	
1919–20	23's	103.8	107.69	122.6
	40's	54.6	53.5	58.5
	60's	33.7	30.7	34.8
	80's	22.6	19.6	22.3
	100's	15.5	12.8	15.6

During the seasons of 1916–17 and 1918–19, when the Meade and Sea Island cottons were grown under normal conditions, the breaking strength of the yarns spun from Meade cotton was weaker than

that of the Sea Island, regardless of the number of yarn spun. During the season of 1919–20, excessive rains in the Sea Island district weakened the strength of the fiber of both cottons before they were picked. The Sea Island cotton was apparently affected more than the Meade, as shown by the breaking strengths of the finer numbers. On the coarser numbers, the Sea Island had the greater strength, whereas on the finer numbers, the two varieties were practically equal in strength.

The Meade cotton grown on clay soil gave a stronger break on 23's yarn than that grown on the sandy soil, but on the finer numbers, the greater breaking strength was obtained from the Meade grown on sandy soil.

SUMMARY.

Meade cotton has been developed as a possible substitute to replace the rapidly diminishing supply of Sea Island cotton. Its length of staple varies from $1\frac{7}{16}$ to $1\frac{3}{4}$ inches, the greater portion being $1\frac{5}{8}$ inches. It matures two to three weeks earlier, gives a greater production of both lint and seed, and is more easily picked than Sea Island.

The grade and staple of the Meade and Sea Island cottons tested were practically equal for the seasons of 1916–17 and 1918–19, but were unavoidably different for the season of 1919–20.

The cotton was run under as nearly identical conditions as possible.

Averaging the visible waste for the three seasons, it was found that the Meade cotton was 3.50 per cent more wasty than the Sea Island.

Comparing the breaking strength of the Meade and Sea Island yarns for the three seasons, a difference of 17.2 pounds was found in favor of the Sea Island for the 23's yarn and 1.68 pounds for the 100's yarn. Under the adverse weather conditions during the growing season of 1919–20, the breaking strength of the sandy soil Meade was equal to that of the Sea Island for the finer numbers of yarn.

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